

## Model Answers: Opening Brackets

Opening Brackets  
study guide



1.

a.  $3(x+y) = 3x+3y$

Use the grid method:

$$\begin{array}{cc} +x & +y \\ \hline +3x & +3y \end{array} + 3$$

Read the solution out of the boxes to give  $3(x+y) = 3x+3y$ .

b.  $x(3-y) = 3x-xy$

Use the grid method:

$$\begin{array}{cc} +3 & -y \\ \hline +3x & -xy \end{array} + x$$

Read the solution out of the boxes to give  $x(3-y) = 3x-xy$ .

c.  $-2y(x+3) = -2xy-6y$

Use the grid method:

$$\begin{array}{cc} +x & +3 \\ \hline -2xy & -6y \end{array} - 2y$$

Read the solution out of the boxes to give  $-2y(x+3) = -2xy-6y$ .

d.  $ab(c+4) = abc+4ab$

Use the grid method:

$$\begin{array}{cc} +c & +4 \\ \hline +abc & +4ab \end{array} + ab$$

Read the solution out of the boxes to give  $ab(c+4) = abc+4ab$ .

e.  $3(x + y - z) = 3x + 3y - 3z$

Use the grid method:

$$\begin{array}{|c|c|c|} \hline +x & +y & -z \\ \hline +3x & +3y & -3z \\ \hline \end{array} + 3$$

Read the solution out of the boxes to give  $3(x + y - z) = 3x + 3y - 3z$ .

f.  $\frac{1}{2}(2x - 7y) = x - \frac{7}{2}y$

Use the grid method:

$$\begin{array}{|c|c|} \hline +2x & -7y \\ \hline +x & -\frac{7}{2}y \\ \hline \end{array} + \frac{1}{2}$$

Read the solution out of the boxes to give  $\frac{1}{2}(2x - 7y) = x - \frac{7}{2}y$ .

g.  $3s(s - 3s^2) = 3s^2 - 9s^3$

Use the grid method:

$$\begin{array}{|c|c|} \hline +s & -3s^2 \\ \hline +3s^2 & -9s^3 \\ \hline \end{array} + 3s$$

Read the solution out of the boxes to give  $3s(s - 3s^2) = 3s^2 - 9s^3$ .

h.  $-(x + y + z) = -x - y - z$

Use the grid method:

$$\begin{array}{|c|c|c|} \hline +x & +y & +z \\ \hline -x & -y & -z \\ \hline \end{array} - 1$$

Read the solution out of the boxes to give  $-(x + y + z) = -x - y - z$ .

2.

a.  $4(x - y) + 5(y - x) - x + y$

Use the grid method twice, once on each term:

1<sup>st</sup> term:

$$\begin{array}{|c|c|} \hline +x & -y \\ \hline +4x & -4y \\ \hline \end{array} + 4$$

2<sup>nd</sup> term:

$$\begin{array}{|c|c|} \hline +y & -x \\ \hline +5y & -5x \\ \hline \end{array} + 5$$

Using these results and simplifying you get:

$$4(x-y) + 5(y-x) = 4x - 4y + 5y - 5x = -x + y$$

b.  $x(5-4y) - 3(x+y) = 2x - 4xy - 3y$

Use the grid method twice, once on each term:

1<sup>st</sup> term:

$$\begin{array}{|c|c|} \hline +5 & -4y \\ \hline +5x & -4xy \\ \hline \end{array} + x$$

2<sup>nd</sup> term:

$$\begin{array}{|c|c|} \hline +x & +y \\ \hline -3x & -3y \\ \hline \end{array} - 3$$

Using these results and simplifying you get:

$$x(5-4y) - 3(x+y) = 5x - 4xy - 3x - 3y = 2x - 4xy - 3y$$

c.  $3(p-2) + 5p - 7 = 8p - 13$

Use the grid method on the first term:

$$\begin{array}{|c|c|} \hline +p & -2 \\ \hline +3p & -6 \\ \hline \end{array} + 3$$

Using this result:

$$3(p-2) + 5p - 7 = 3p - 6 + 5p - 7 = 8p - 13$$

d.  $3 - \frac{1}{4}(4x - 12y + 16) = -1 - x + 3y$

Use the grid method on the second term:

$$\begin{array}{|c|c|c|} \hline +4x & -12y & +16 \\ \hline -x & +3y & -4 \\ \hline \end{array} - \frac{1}{4}$$

Using this result:

$$3 - \frac{1}{4}(4x - 12y + 16) = 3 - x + 3y - 4 = -1 - x + 3y$$

3.

a.  $(x + y)(x - y) = x^2 - y^2$

Use the grid method:

$+x$	$+y$	
$+x^2$	$+xy$	$+x$
$-xy$	$-y^2$	$-y$

Read the solution out of the boxes to give  $(x + y)(x - y) = x^2 + xy - xy - y^2 = x^2 - y^2$ .

b.  $(x - y)^2 = x^2 - 2xy + y^2$

Firstly recognise that  $(x - y)^2 = (x - y)(x - y)$  and so you can use the grid method:

$+x$	$-y$	
$+x^2$	$-xy$	$+x$
$-xy$	$+y^2$	$-y$

Read the solution out of the boxes to give  $(x - y)^2 = x^2 - xy - xy + y^2 = x^2 - 2xy + y^2$ .

c.  $(x + 2y)^2 = x^2 + 4xy + 4y^2$

Firstly recognise that  $(x + 2y)^2 = (x + 2y)(x + 2y)$  and so you can use the grid method:

$+x$	$+2y$	
$+x^2$	$+2xy$	$+x$
$+2xy$	$+4y^2$	$+2y$

Read the solution out of the boxes to give:

$$(x + 2y)^2 = x^2 + 2xy + 2xy + 4y^2 = x^2 + 4xy + 4y^2.$$

d.  $(3x - 5y^2)(y - 3x^2) = 3xy - 5y^3 - 9x^3 + 15x^2y^2$

Use the grid method:

$+3x$	$-5y^2$	
$+3xy$	$-5y^3$	$+y$
$-9x^3$	$+15x^2y^2$	$-3x^2$

Read the solution out of the boxes to give:

$$(3x - 5y^2)(y - 3x^2) = 3xy - 5y^3 - 9x^3 + 15x^2y^2.$$

e.  $(a + 2b - 3c)(2a - b + c) = 2a^2 + 3ab - 5ac - 2b^2 + 5bc - 3c^2$

Use the grid method:

$+a$	$+2b$	$-3c$	
$+2a^2$	$+4ab$	$-6ac$	$+2a$
$-ab$	$-2b^2$	$+3bc$	$-b$
$+ac$	$+2bc$	$-3c^2$	$+c$

Read the solution out of the boxes to give:

$$\begin{aligned} (a + 2b - 3c)(2a - b + c) &= 2a^2 + 4ab - 6ac - ab - 2b^2 + 3bc + ac + 2bc - 3c^2 \\ &= 2a^2 + 3ab - 5ac - 2b^2 + 5bc - 3c^2 \end{aligned}$$

f.  $(r - s)(r + s)(2r - 3s) = 2r^3 - 2rs^2 - 3r^2s + 3s^3$

The grid method can only multiply pairs of brackets and so you need to break this problem down. For example you can multiply the first two brackets and then multiply the result of this by the third bracket:

$+r$	$-s$	
$+r^2$	$-rs$	$+r$
$+rs$	$-s^2$	$+s$

Read the solution out of the boxes to give  $(r - s)(r + s) = r^2 + rs - rs - s^2 = r^2 - s^2$  and multiply this result by the third bracket:

$+r^2$	$-s^2$	
$+2r^3$	$-2rs^2$	$+2r$
$-3r^2s$	$+3s^3$	$-3s$

Read the solution out of the boxes to give:

$$(r - s)(r + s)(2r - 3s) = 2r^3 - 2rs^2 - 3r^2s + 3s^3.$$



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